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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/726,398	12/02/2003	John B. McVey	EH-10785(02-597)	5632

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BACHMAN & LAPOINTE, P.C.
900 CHAPEL STREET
SUITE 1201
NEW HAVEN, CT 06510

EXAMINER

PHILOGENE, HAISSA

ART UNIT	PAPER NUMBER
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2828

DATE MAILED: 02/10/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary	Application No. 10/726,398	Applicant(s) MCVEY ET AL.	
	Examiner Haissa Philogene	Art Unit 2828	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 December 2003.
2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☒ Claim(s) 15-19 is/are allowed.
6) ☒ Claim(s) 1-3, 8, 9, 11, 13 and 14 is/are rejected.
7) ☐ Claim(s) 4-7, 10 and 12 is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 02 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>12/02/03</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Objections

Claim 9 is objected to because of the following informalities: In lines 1 and 2, change "gas distribution channel" to --gas distribution anode--. Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 13 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The term "exhaust streams" is not clear. Does Applicant mean to say "exhaust plumes" or "exhaust beams" as mentioned in the specification or something else? Applicant is requested to clarify this matter.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 2, 8 and 14 are rejected under 35 U.S.C. 102(b) as being anticipated by Valentian et al., Patent No. 6,279,314.

As per claim 1, Valentian discloses a Hall effect thruster (see Col.5, line 29 and Col.9, line 1) comprising at least two acceleration channels (124A, 124B); and a plurality of coils (131), mounted on cores (137) and interconnected by an array of ferromagnetic bars (136), readable as a plurality of flux guides co-operating with said two adjacent channels 124A, 124B (see Figs. 3 and 6 and also Col.7, lines 6-7 and 21-23) since the coils can simultaneously produce accelerating flux and guide field upon energization.

As per claim 2, Valentian discloses each of said acceleration channels (124A, 124B) having an annular configuration (see Figs. 3 and 6).

As per claim 8, Valentian discloses each of said acceleration channels (124A, 124B) having a gas distribution anode (125A, 125B) for introducing a propellant (ionizable gas) via at least pipe 126A, isolator 300A, hose 118A, manifold 127A (see Fig.14).

As per claim 14, Valentian discloses each said channel (124A, 124B) having non-parallel surfaces (see Figs. 1 and 3 and see also Col.2, lines 60-61, Col.5, lines 39-42, Col.6, lines 56-57).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Valentian et al in view of Kerst, Patent No. 4,577,156.

Valentian discloses the claimed invention substantially as explained above except for adjacent ones of said acceleration channels generating counter-rotating exhaust streams. Kerst discloses an accelerator or thruster (10) having adjacent ones of said acceleration tubes or channels (12, 14 and Col.6, lines 41-45) generating counter-rotating beams 16, 18 (see Figs.1, 4, 6 and 7 and Col.7, lines 59-66 and Col.9, lines 9-11). It would have been obvious to a person having ordinary skill in the art at the time the invention was made to employ the adjacent channels with counter-rotating beams as taught by Kerst into the Valentian type thruster, because it would allow each beam to be accelerated by substantially the full change in the alternating accelerating flux between its opposite peaks, thereby maximizing the energy levels of the beams.

Claims 3 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Valentian et al. in view of Kaufman, Patent No. 5,763,989.

As per claim 3, Valentian discloses the claimed invention substantially as explained above. Valentian does not disclose the acceleration channels having a non-annular configuration. Kaufman discloses a thruster having acceleration channels having an annular configuration although more complicated configurations can also be used (see Col.1, lines 56-58) which inherently includes a non-annular configuration. Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to utilize non-annular configuration channels as taught by

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Kaufman into the Valentian type thruster. This can be done by replacing the Valentian's annular configuration channels with Kaufman's non- annular configuration channels, because it would allow in all cases acceleration channels in the shape of a closed path to achieve a closed-drift thruster.

As per claim 11, Valentian discloses the claimed invention substantially as explained above. Valentian does not explicitly disclose the at least one cathode for neutralizing current. However, this feature is well-known in the art as evidenced by Kaufman which discloses in Fig.4 a thruster having at least one cathode (42, 62) for neutralizing current (see Col.7, lines 55-57).). It would have been obvious to a person having ordinary skill in the art at the time the invention was made to employ the cathode for neutralizing current as taught by Kaufman into the Valentian type thruster, because it would allow a current neutralization of energetic ion beam formed from ions that do not recombine with electrons on surfaces of anode and magnetic poles accelerated outward by electric field.

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Valentian et al. in view of Petrosov et al., Patent NO. 5,845,880, cited by Applicant.

Valentian discloses the claimed invention substantially as explained above. Further, Valentian discloses said gas distribution [channel] anode 125A in a first one (124A) of said acceleration channels 124A, 124B introducing a first propellant (ionizable gas) via pipe 126A and a gas distribution [channel] anode 125B in a second one (124B) of said acceleration channels 124A, 124B introducing a second propellant (ionizable

gas) via pipe 126B (not shown). Although Valentian discloses the ionizable gas being Xenon (see Col.10, line 37), Valentian does not disclose the second propellant being different from the first propellant . Petrosov discloses in Fig.3 a thruster having a pipe 25 delivering a propellant such as Xenon, Krypton or Argon gas into an anode 24 from which it is delivered to a channel 20. Note that Xenon, Krypton and Argon gases are different from each other. Therefore, it would have obvious to a person having ordinary skill in the art at the time the invention was made to employ different propellant as taught by Petrosov into the Valentian type thruster. This can be done for employing, in this case, propellant Xenon gas in the first gas distribution anode and propellant Krypton gas in the second gas distribution anode, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use.

Allowable Subject Matter

Claims 4-7, 10 and 12 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 15-19 are allowed.

The following is a statement of reasons for the indication of allowable subject matter: The prior art fails to disclose "said plurality of flux guides includes at least one intermediate flux guide situated between two adjacent acceleration channels" (claims 4 and 12); "different discharge voltage to each channel" (claim 10); "a first channel surrounding a second channel" (claim 15).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

King, Patent No. 6,215,124; Latschev et al., Patent No. 6,158,209; Kaufman et al., Patent No. 4,862,032.

Correspondence

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Haissa Philogene whose telephone number is (571) 272-1827. The examiner can normally be reached on 6:30 A.M.-6:00 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Minsun Harvey can be reached on (571) 272-1835. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

hp

Haissa Philogene
Primary Examiner
A.U. 2828
